

PMEG2010EPA

20 V, 1 A low VF Schottky barrier rectifier

10 September 2024 **Product data sheet**

1. General description

Planar Schottky barrier rectifier with an integrated guard ring for stress protection, encapsulated in an ultra thin SOT1061 leadless small Surface-Mounted Device (SMD) plastic package with medium power capability.

2. Features and benefits

- Average forward current $I_{F(AV)} \leq 1$ A
- Reverse voltage $V_R \leq 20$ V
- Low reverse current
- Exposed heat sink (cathode pad) for excellent thermal and electrical conductivity
- Leadless small SMD plastic package with medium power capability
- AEC-Q101 qualified

3. Applications

- Low voltage rectification
- High efficiency DC-to-DC conversion
- Switch Mode Power Supply (SMPS)
- Reverse polarity protection
- Low power consumption applications
- Battery chargers for mobile equipment

4. Quick reference data

Table 1. Quick reference data

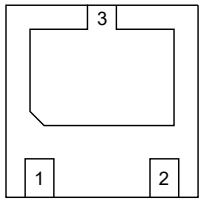
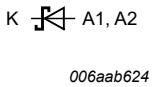
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$I_{F(AV)}$	average forward current	δ = 0.5; f = 20 kHz; square wave; $T_{amb} \leq$ 125 °C	[1]	-	-	1	A
		δ = 0.5; f = 20 kHz; square wave; $T_{sp} \leq$ 145 °C		-	-	1	A
V_R	reverse voltage	T_j = 25 °C		-	-	20	V
V_F	forward voltage	I_F = 1 A; T_j = 25 °C		-	320	375	mV
I_R	reverse current	V_R = 20 V; T_j = 25 °C		-	335	1900	µA

[1] Device mounted on a ceramic Printed-Circuit Board (PCB), Al_2O_3, standard footprint.

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5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	A	anode	 Transparent top view **DFN2020-3 (SOT1061)**	 *006aab624*
2	A	anode		
3	K	cathode		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PMEG2010EPA	DFN2020-3	plastic, leadless thermal enhanced ultra thin small outline package; 3 terminals; 1.3 mm pitch; 2 mm x 2 mm x 0.65 mm body	SOT1061

7. Marking

Table 4. Marking codes

Type number	Marking code
PMEG2010EPA	A1

8. Limiting values

Table 5. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions		Min	Max	Unit
V_R	reverse voltage	T_j = 25 °C		-	20	V
$I_{F(AV)}$	average forward current	δ = 0.5; f = 20 kHz; square wave; T_{amb} ≤ 125 °C	[1]	-	1	A
		δ = 0.5; f = 20 kHz; square wave; T_{sp} ≤ 145 °C		-	1	A
I_{FRM}	repetitive peak forward current	t_p ≤ 1 ms; δ ≤ 0.25	[2]	-	7	A
I_{FSM}	non-repetitive peak forward current	t_p = 8 ms; square wave; $T_{j(init)}$ = 25 °C	[2]	-	17	A
P_{tot}	total power dissipation	T_{amb} ≤ 25 °C	[3] [4]	-	500	mW
			[3] [5]	-	960	mW
			[3] [1]	-	1.8	W
T_j	junction temperature			-	150	°C
T_{amb}	ambient temperature			-55	150	°C

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Symbol	Parameter	Conditions		Min	Max	Unit
T_{stg}	storage temperature			-65	150	°C

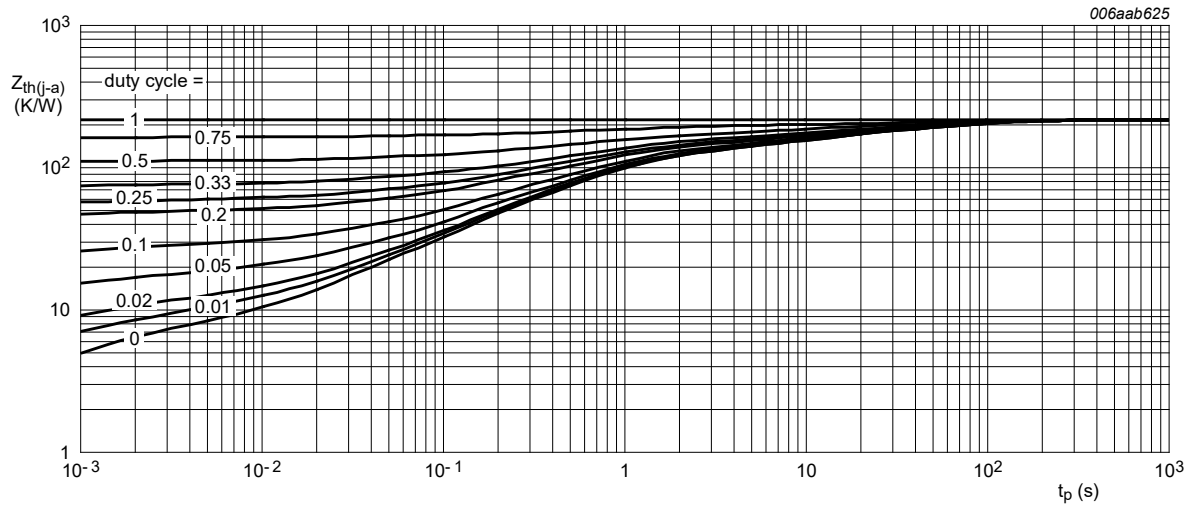
[1] Device mounted on a ceramic Printed-Circuit Board (PCB), Al_2O_3, standard footprint.
[2] Both anode pins connected.
[3] Reflow soldering is the only recommended soldering method.
[4] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.
[5] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm^2.

9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1] [2] [3]	-	-	250	K/W
			[1] [4] [3]	-	-	130	K/W
			[1] [5] [3]	-	-	70	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point		[6]	-	-	12	K/W

[1] For Schottky barrier diodes thermal runaway has to be considered, as in some applications the reverse power losses P_R are a significant part of the total power losses.
[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.
[3] Reflow soldering is the only recommended soldering method.
[4] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm^2.
[5] Device mounted on a ceramic PCB, Al_2O_3, standard footprint.
[6] Soldering point of cathode tab.

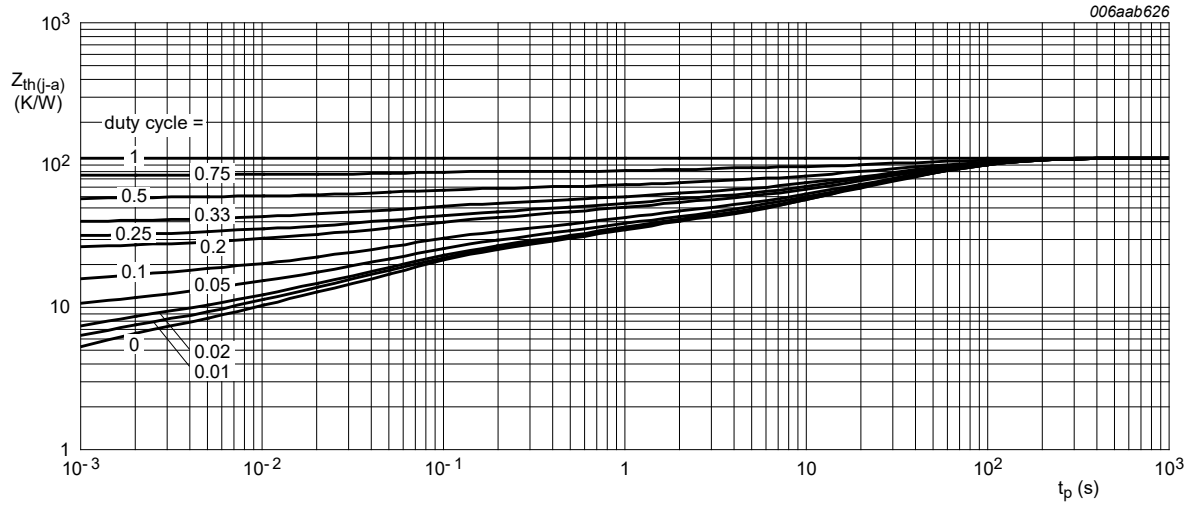


FR4 PCB, standard footprint

Fig. 1. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

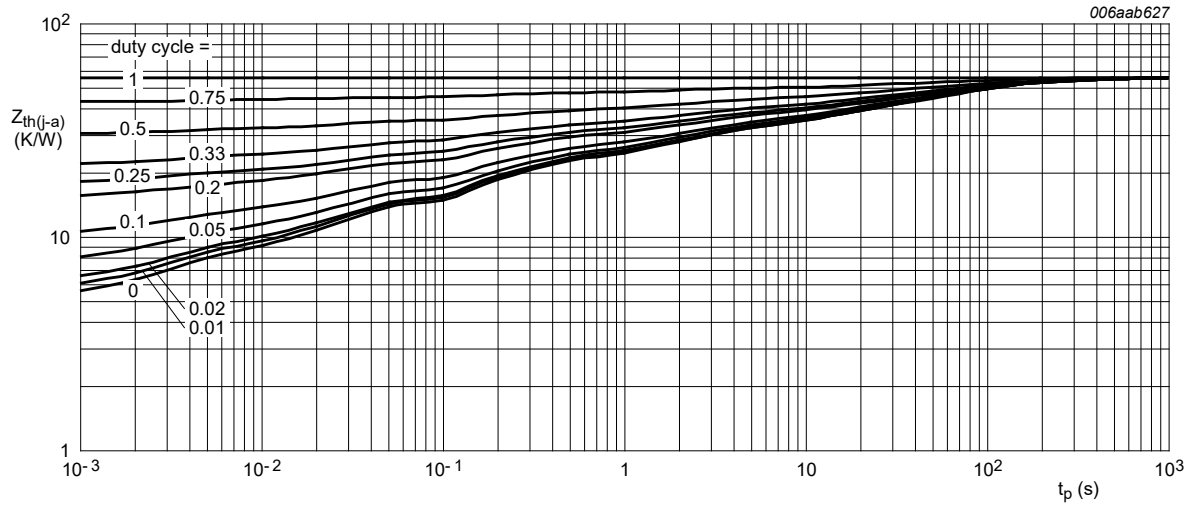
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FR4 PCB, mounting pad for cathode 1 cm^2

Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values



Ceramic PCB, Al_2O_3, standard footprint

Fig. 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

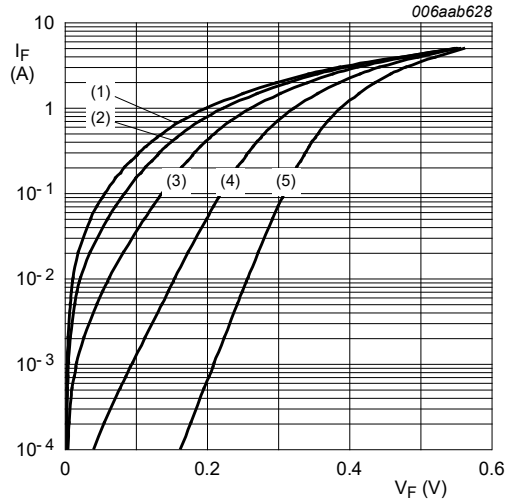
10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_F	forward voltage	I_F = 0.5 A; T_j = 25 °C		-	280	-	mV
		I_F = 1 A; T_j = 25 °C		-	320	375	mV
I_R	reverse current	V_R = 10 V; T_j = 25 °C		-	135	-	µA
		V_R = 20 V; T_j = 25 °C		-	335	1900	µA
C_d	diode capacitance	V_R = 1 V; f = 1 MHz; T_j = 25 °C		-	175	-	pF
		V_R = 10 V; f = 1 MHz; T_j = 25 °C		-	65	-	pF
t_{rr}	reverse recovery time	I_F = 10 mA; I_R = 10 mA; $I_{R(meas)}$ = 1 mA; R_L = 100 Ω; T_j = 25 °C		-	50	-	ns

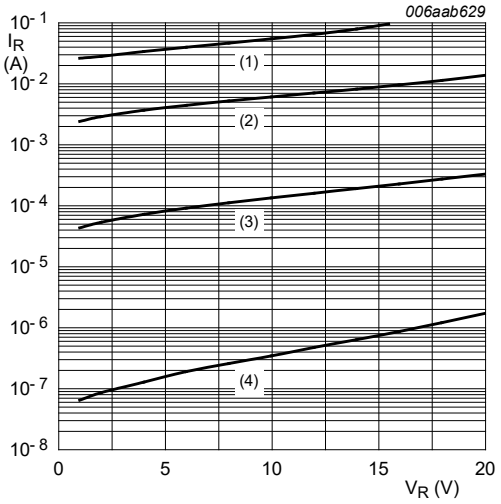
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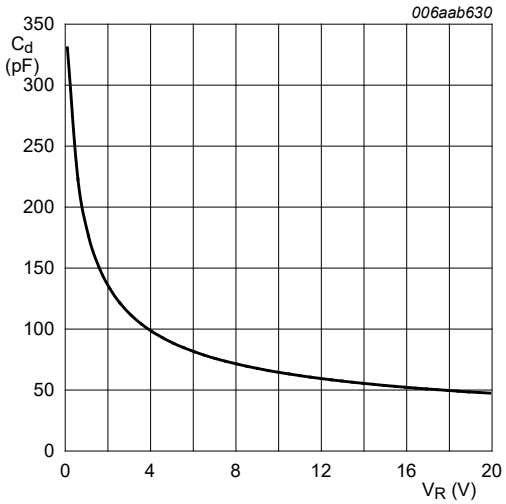
(1) T_j = 150 °C
(2) T_j = 125 °C
(3) T_j = 85 °C
(4) T_j = 25 °C
(5) T_j = −40 °C

Fig. 4. Forward current as a function of forward voltage; typical values



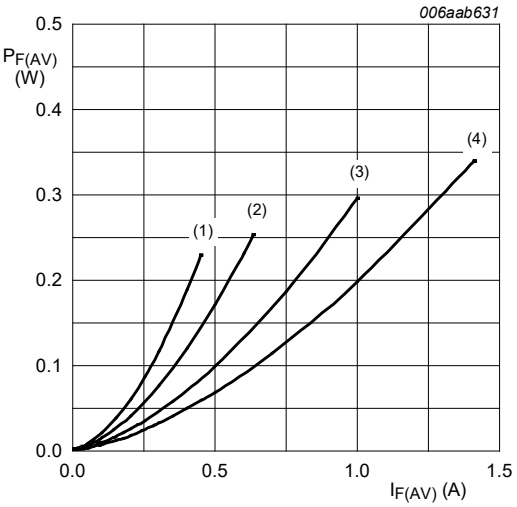
(1) T_j = 125 °C
(2) T_j = 85 °C
(3) T_j = 25 °C
(4) T_j = −40 °C

Fig. 5. Reverse current as a function of reverse voltage; typical values



f = 1 MHz; T_{amb} = 25 °C

Fig. 6. Diode capacitance as a function of reverse voltage; typical values

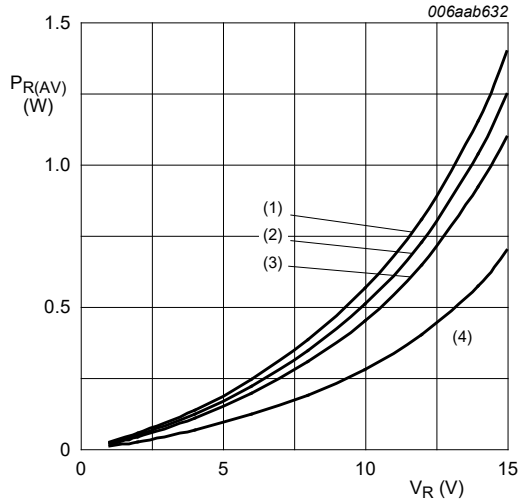


T_j = 150 °C
(1) δ = 0.1
(2) δ = 0.2
(3) δ = 0.5
(4) δ = 1

Fig. 7. Average forward power dissipation as a function of average forward current; typical values

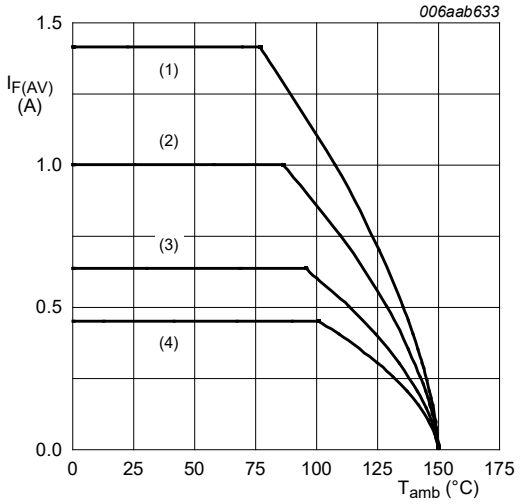
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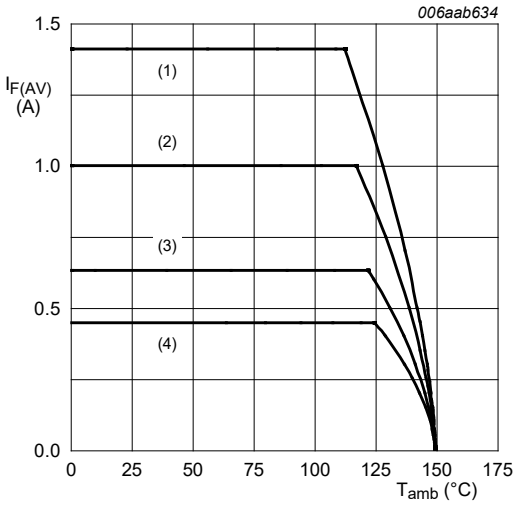
T_j = 125 °C
(1) δ = 1
(2) δ = 0.9
(3) δ = 0.8
(4) δ = 0.5

Fig. 8. Average reverse power dissipation as a function of reverse voltage; typical values



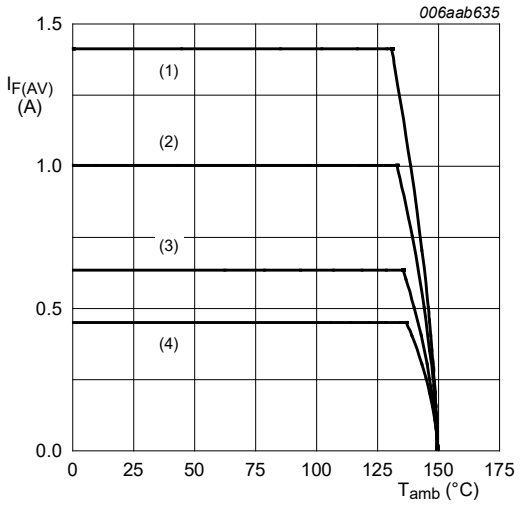
FR4 PCB, standard footprint
T_j = 150 °C
(1) δ = 1; DC
(2) δ = 0.5; f = 20 kHz
(3) δ = 0.2; f = 20 kHz
(4) δ = 0.1; f = 20 kHz

Fig. 9. Average forward current as a function of ambient temperature; typical values



FR4 PCB, mounting pad for cathode 1 cm^2
T_j = 150 °C
(1) δ = 1; DC
(2) δ = 0.5; f = 20 kHz
(3) δ = 0.2; f = 20 kHz
(4) δ = 0.1; f = 20 kHz

Fig. 10. Average forward current as a function of ambient temperature; typical values

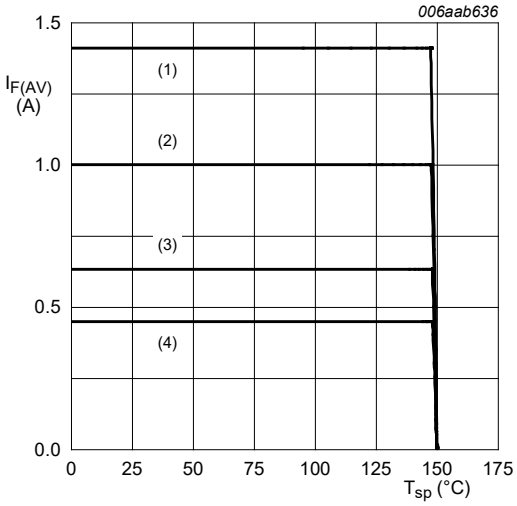


Ceramic PCB, Al_2O_3, standard footprint
T_j = 150 °C
(1) δ = 1; DC
(2) δ = 0.5; f = 20 kHz
(3) δ = 0.2; f = 20 kHz
(4) δ = 0.1; f = 20 kHz

Fig. 11. Average forward current as a function of ambient temperature; typical values

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T_j = 150 °C
(1) δ = 1; DC
(2) δ = 0.5; f = 20 kHz
(3) δ = 0.2; f = 20 kHz
(4) δ = 0.1; f = 20 kHz

Fig. 12. Average forward current as a function of solder point temperature; typical values

11. Test information

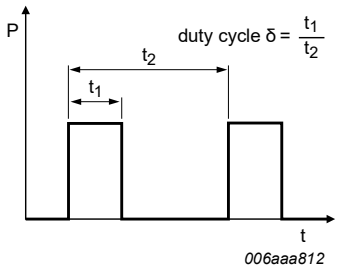


Fig. 13. Duty cycle definition

The current ratings for the typical waveforms are calculated according to the equations:

$I_{F(AV)}=I_M \times \delta$ with I_M defined as peak current

$I_{RMS}=I_{F(AV)}$ at DC

$I_{RMS}=I_M \times \sqrt{\delta}$ with I_{RMS} defined as RMS current

Quality information

This product has been qualified in accordance with the Automotive Electronics Council (AEC) standard *Q101 - Stress test qualification for discrete semiconductors*, and is suitable for use in automotive applications.

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12. Package outline

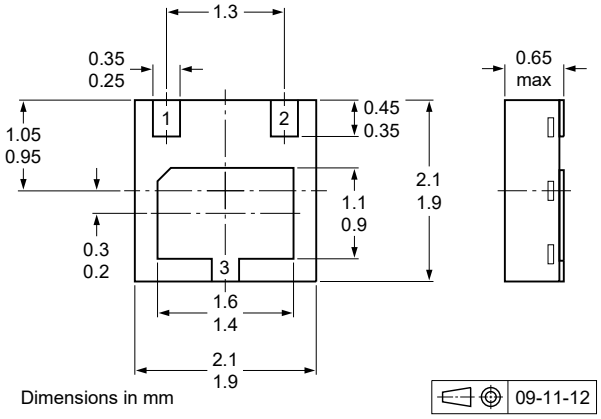


Fig. 14. Package outline DFN2020-3 (SOT1061)

13. Soldering

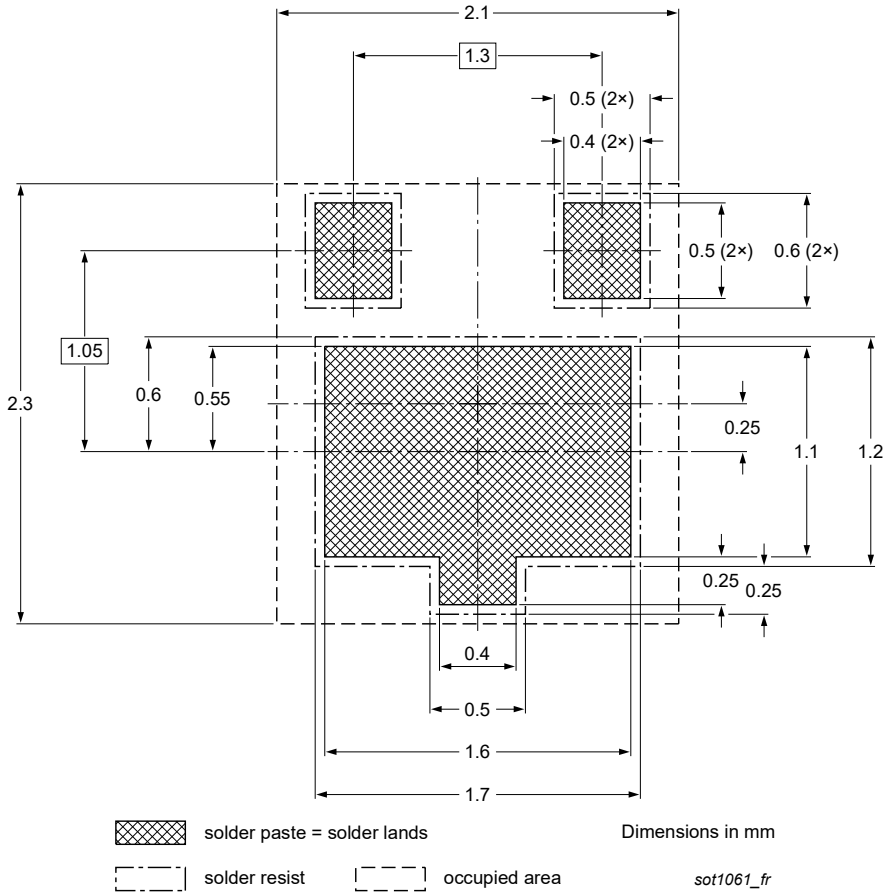


Fig. 15. Reflow soldering footprint for DFN2020-3 (SOT1061)

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14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PMEG2010EPA v.2	20240910	Product data sheet	-	PMEG2010EPA_1
Modifications:	• The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia. • Legal texts have been adapted to the new company name where appropriate. • Section "Packing information" removed.			
PMEG2010EPA_1	20091215	Product data sheet	-	-

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15. Legal information

Data sheet status

Document status [1][2]	Product status [3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

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[2] The term 'short data sheet' is explained in section "Definitions".
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